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Genetic and biological variability of calves placed into different retained ownership programs are examined. The genetic ability to grade choice is a critical factor influencing profitability of retaining calves to a slaughter weight. Weaning weight influences the type of retained ownership program for which a calf will be most profitable.

Retained ownership is a marketing strategy that involves maintaining ownership of young cattle beyond calf weaning, a traditional marketing time for many producers. Numerous retained ownership strategies exist. Calves may be retained on the ranch and fed for a relatively low rate of gain through the winter and then be sold in the spring or placed on grass through the summer and sold in the fall. Ownership of calves in a custom feedlot also is a possibility, and calves may be sold after a backgrounding period or fed out to a slaughter weight before sales occur. It is important for producers to clearly understand the advantages and disadvantages of retained ownership in general and of specific retained ownership strategies in order to fully evaluate profit potentials.

The advantages of retained ownership include 1) a potential for increased profits, 2) a reduction in risk as a result of less variability in net income, and 3) increased marketing flexibility which can lead to more efficient utilization of forage resources. Stokes, Farris, and Cartwright analyzed retained ownership of calves in a custom feedlot using a deterministic framework. They concluded that net returns were higher when calves were custom fed rather than being sold at weaning. Simms and Maddux have shown that on average returns to retained ownership of steers in a feedlot are positive. They also found that over a period of 14 years, selling calves at weaning resulted in negative net income in 8 years for Kansas producers. Feuz and Kearl evaluated on-ranch retained ownership of calves also in a deterministic framework and they found that net ranch income was increased by selling yearlings rather than calves. Held, Feuz, and Edens expanded this on-ranch study to evaluate income variability. They used a TARGET-MOTAD approach and found that retaining calves and selling them as yearlings reduced the amount of negative income deviations from a target level of income. In an earlier study, Gebremeskel and Shumway used a MOTAD model to analyze this marketing problem. They found that retaining ownership of at least part of the calves occurred under all production scenarios considered. Several authors have expanded the marketing decision framework beyond simply an all or nothing decision at weaning time. Lambert used a discrete stochastic programming model and found retained ownership to be profitable even after adjusting for risk. Garoian, Mjelde, and Conner set up a dynamic programming model to evaluate the retained ownership decision under various forage availability scenarios. The results of their model indicated profits could be increased and income variability decreased by reducing the size of the cow herd and selling more yearlings rather than calves. This type of strategy allowed for a more efficient use of the uncertain forage resource.

Retained ownership of cattle is not without problems. Disadvantages may include 1) an increase in the level of management/marketing expertise, 2) an increase in labor requirements for on-ranch retained ownership, 3) an increase in financing requirements, and 4) potential tax problems. Mjelde, Conner and Nixon incorporated tax considerations into a dynamic programming model and evaluated the retained ownership decision. They found, like most studies, that retained ownership was profitable. However, if a ranch was not currently retaining ownership of calves, then considering tax implications, it was most profitable to continue to sell most of the calves at weaning.

The previous studies have indicated a potential for increased profits, reduced income variation, and greater market flexibility with various retained ownership programs. One source of income variation that has not been adequately addressed in these studies is the genetic and biological differences of calves

being retained. A 1990-91 South Dakota Retained Ownership Demonstration Program (Wagner et al., 1991) showed that profitability ranged from -$56.57 to $131.36 per head for calves retained under the same program. Clearly, variation in potential profits associated with retained ownership exists within each year due to different cattle types.

The objectives of this paper are: 1)to identify key biological and genetic variables that influence the profitability of calves in a retained ownership program, 2) identify the most profitable type of retained ownership program for a particular type of calf, and 3) quantify the premiums/discounts producers may be receiving from selling calves at weaning.

RETAINED OWNERSHIP STRATEGIES

Numerous retained ownership strategies exist both on and off of the ranch. This paper will concentrate on three custom feedlot strategies: 1) an accelerated finishing program, 2) a traditional two-phased growing and finishing program, and 3) a moderate rate of gain backgrounding only program. Some reference also will be made to on-ranch yearling retained ownership programs.

Accelerated Finishing Program

Average profitability of 255 steers fed an accelerated finishing program as part of the South Dakota Retained Ownership Demonstration was $38.75 per head. Profitability of the 51 groups of five steers was extremely variable, however, ranging from -$56.57 to $131.36 per head. Table 1 displays the data divided into the low, middle and high profitability groups. The high profitability groups earned a profit of nearly $75 per head. These cattle were initially heavier and older. They gained weight more rapidly, were fed fewer days and graded an average of 62.9% Choice. Clearly, larger, growthier cattle with the propensity to grade Choice were well suited for the accelerated finishing program. Lighter cattle without the ability to gain 3 pounds daily and without the capability of grading Choice were not well suited for accelerated finishing. Since the cattle were sold on a grade and yield basis, it is not surprising that quality grade and dressing percent were positively correlated with profit.

Cost of gain was slightly greater for the high profit steers compared with the low and middle profit steers. However, cost of gain was negatively correlated to profit in general. Average daily gain was important as it relates to days on feed. As rate of gain increases, fewer days are required to reach market weight. Market prices were stronger earlier in the year and declined steadily through the spring until the slowest gaining cattle were sold. This trend has occurred over the past several years and will likely occur in the near future as more calves and fewer yearlings are placed on feed. Long-term, there may be opportunities for producers to alter calving season and production systems to best fit the winter fed cattle market.

Generally, it is assumed that British cattle are not suited to accelerated finishing programs. The tendency in the industry is to grow these cattle on roughage programs in order to presumably increase slaughter weight. However, calves sired by Angus bulls appeared profitable under this accelerated feeding program (Table 2). This was due to their ability to grade Choice more readily than some of the other cattle. On the surface, Hereford sired calves appear less profitable in this system. The profitability estimates calculated in this study were based on an average initial price for the calf based only on differences in calf weight. If discounts of $4 to $6 per cwt normally seen for Hereford calves and $4 to $6 premiums normally seen for some exotic calves at weaning were applied to this analysis, differences between breed types would be diminished. Provided a minimum carcass weight of 600 lb is achieved, British cattle can be fed successfully in this system if they gain rapidly enough to be marketed early or if they have the genetic capability to grade Choice.

TABLE 1. PROFITABILITY OF STEERS FED AN ACCELERATED FINISHING DIET AND THE INFLUENCE OF SELECTED BIOLOGICAL AND PRODUCTION VARIABLES.

Variable	Correlation to Profit	Profitability Group		
		Low 1/3	Middle 1/3	High 1/3
Profit	1.00*	$-0.67	$41.46	$74.68
Initial Weight (lbs)	0.16*	561	554	605
Initial Height (inches)	0.07	44.80	44.75	45.49
Initial Age (days)	0.24*	201	202	216
Feedlot ADG (lbs)	0.59*	2.79	2.95	3.07
Days Fed (days)	-0.38*	206	194	188
Cost of Gain	-0.24*	$52.46	$51.46	$53.00
Slaughter Weight (lbs)	0.34*	1134	1125	1181
Yield Grade	0.24*	2.61	2.62	2.91
Dressing Percent (%)	0.42*	63.42	63.68	64.69
Percent Choice (%)	0.67*	28.5	47.6	62.9

* Denotes that ρ is significantly different from 0 at the $\alpha = .05$ level

TABLE 2. EFFECT OF SIRE BREED ON PROFITABILITY AND VARIOUS PERFORMANCE AND CARCASS TRAITS FOR STEERS FED AN ACCELERATED FINISH DIET.

Breed	Initial weight	Final weight	Days fed	ADG	Hot carcass weight	Yield grade	Percent choice	Profit
Angus	531	1079	185	2.97	689	3.06	77.5	60.73
Charolais	576	1159	200	2.93	743	2.64	46.7	35.71
Gelbvieh	602	1162	193	2.90	754	2.65	42.9	51.94
Hereford	561	1092	173	3.07	684	3.40	0	17.24
Limousin	539	1162	214	2.92	764	2.05	26.7	37.99
Simmental	602	1201	204	2.94	760	2.54	45.7	23.01

Traditional Two-Phase Growing and Finishing Program

Average profitability of 90 steers fed a traditional, two-phased program as part of the South Dakota Retained Ownership Demonstration was $16.69 per head. Profitability of the 18 groups of five head varied from -$39.57 to $57.26 per head. Table 3 displays the information for the low, middle and high profitability groups, as well as the correlation to profit of selected variables.

The high profitability group averaged $50.36 per head profit. These cattle were slightly heavier, older and larger framed initially. They gained weight more rapidly, were fed fewer days, had higher dressing percentages and graded an average of 70% Choice. Cattle in the lowest profitability group appeared to lack the ability to reach the Choice grade. The correlation coefficients support the general observations from the profitability groups. The ability to grade choice is highly correlated with profit, as is ADG in the feedlot. The number of days on feed and the cost of gain are both negatively correlated with profit.

Table 4 shows the effect of breed type on profitability and other variables for cattle fed the two-phased program. Angus sired cattle graded Choice more readily and were therefore profitable under this system. Cattle without the propensity to grade Choice were less profitable in this two-phased system. Profitability of Charolais and Gelbvieh sired cattle had $50 per head lower profits under the two-phased system than under the accelerated program (Table 2). Cattle with the capability of gaining rapidly and reaching an acceptable market weight early should be pushed accordingly, especially if they do not have the potential to grade Choice. In 1991 and during the last 3 years, fed cattle prices have been stronger and the Choice-Select price spread narrower earlier in the year. Fed cattle prices were lower and the quality discount was greater as the year progressed.

Background Only Program

Average profitability of the backgrounded steers from the South Dakota Retained Ownership Demonstration would have been -$1.84 if they would have been sold in February. By feeding these cattle through slaughter, an average of $18.53 additional profit per head was earned. Examining the data split up into the upper, middle and lower one-third profitability groups reveals an interesting trend (Table 5).

TABLE 3. PROFITABILITY OF STEERS FED A TWO-PHASE GROWING AND FINISHING DIET AND THE INFLUENCE ON PROFIT OF SELECTED BIOLOGICAL AND PRODUCTION VARIABLES.

	Correlation	Profitability Group		
Variable	to Profit	Low 1/3	Middle 1/3	High 1/3
Profit	1.00*	$-22.46	$22.17	$50.36
Initial Weight (lbs)	0.18*	492	498	522
Initial Height (inches)	0.21*	42.88	42.77	44.09
Initial Age (days)	0.26*	190	195	206
Feedlot ADG (lbs)	0.57*	2.66	2.75	2.91
Days Fed (days)	-0.33*	221	214	207
Cost of Gain	-0.21*	$53.00	$52.35	$52.81
Slaughter Weight (lbs)	0.29*	1079	1085	1124
Yield Grade	0.14	2.84	2.49	2.83
Dressing Percent (%)	0.37*	63.89	64.64	64.73
Percent Choice (%)	0.63*	20.3	56.7	70.0

* Denotes that ρ is significantly different from 0 at the $\alpha = .05$ level

TABLE 4. EFFECT OF SIRE BREED ON PROFITABILITY AND VARIOUS PERFORMANCE AND CARCASS TRAITS FOR STEERS FED A TWO-PHASED GROWING AND FINISHING DIET.

Breed	Initial weight	Final weight	Days fed	ADG	Hot carcass weight	Yield grade	Percent choice	Profit
Angus	506	1093	208	2.82	703	2.99	76.9	39.73
Charolais	509	1142	231	2.75	736	2.57	35.0	-15.12
Gelbvieh	499	1119	230	2.70	721	2.37	57.1	3.30
Hereford	485	1013	199	2.65	645	2.94	6.7	-12.33
Limousin	507	1010	200	2.52	662	2.45	40.0	15.10

Cattle in the high profitability group made an average of $23.88 per head and weighed 452 pounds when they entered the feedlot. Cattle in the low profitability group lost an average of $29.06 per head and weighed 556 pounds. Profitability of cattle in the low profitability group was improved by $64.06 per head when fed to slaughter. Profitability of the middle and high profitability cattle was reduced by $1.20 and $7.25 per head when fed to slaughter.

The low, middle and high profitability groups correspond exactly to the high, middle and low initial weight groups, respectively. Initial weight and profit are near perfect in their negative correlation. Therefore, this information suggests that lighter weight (perhaps younger weaned) calves should be backgrounded and sold as feeders. Profitability is reduced by feeding these calves to slaughter. These lighter calves may also have greater potential in an on-ranch yearling program.

On the surface, Hereford sired cattle appeared more profitable under this system than other breeds (Table 6). However, if discounts were applied to the initial value and yearling sale price, this advantage may be diminished.

TABLE 5. PROFITABILITY OF STEERS FED A BACKGROUND GROWING DIET AND THE VALUE OF SELECTED BIOLOGICAL AND PRODUCTION VARIABLES.

Variable	Correlation to Profit	Profitability Group		
		Low 1/3	Middle 1/3	High 1/3
Profit	1.00*	$-29.06	$-0.35	$23.88
Initial Weight (lbs)	-0.98*	556	504	452
Initial Height (inches)	-0.75*	44.58	42.78	42.33
Initial Age (days)	-0.38*	204	190	198
Feedlot ADG (lbs)	-0.12	2.37	2.15	2.21
Cost of Gain	-0.60*	$58.89	$58.20	$54.20
February Weight (lbs)	-0.83*	821	745	700

* Denotes that ρ is significantly different from 0 at the $\alpha = .05$ level

TABLE 6. EFFECT OF BREED TYPE ON PROFITABILITY AND PERFORMANCE OF BACKGROUNDED STEERS.

Breed	Profit	Initial weight	Initial age	ADG	Cost of gain	Final weight
Angus	-1.91	506	203	2.27	57.08	760
Charolais	-2.90	509	189	2.22	63.14	758
Gelbvieh	-5.52	499	207	2.09	60.55	733
Hereford	9.81	485	191	2.23	55.85	735
Limousin	-3.40	507	203	2.04	60.53	735

Results of the study of Wyoming ranches previously cited (Feuz and Kearl), showed that as weaning weights increased, calves became less profitable in a summer yearling retained ownership program. These findings substantiate those from the South Dakota that heavier calves with the ability to grow should be grown as quickly as possible, while lighter weight calves are generally more profitable in background only or yearling stocker programs.

PREMIUMS/DISCOUNTS FROM SELLING CALVES

An insightful method of analyzing the returns associated with retained ownership is to determine the break-even selling price for a weaned calf. This break-even price can then be compared with the actual market price at the time the calves were weaned. The difference between these two prices represents the premium producers should receive who sell calves at weaning that are profitable in a retained ownership program, or the discount producers could receive who sell calves that are not profitable to retain. The following equation was used to determine this premium or discount:

$$PREMIUM\ (DISCOUNT) = \left(\frac{SV - TC}{CW}\right) - CP$$

where **CP** is the weaned calf price ($/cwt), **SV** is the sale value at the end of the retained ownership program, **TC** is the total cost of the retained ownership program (excluding the initial calf value), and **CW** is the weight of the weaned calf (cwt). The premium or discount is expressed in $/cwt.

In the South Dakota study, if the steers in the accelerated finish program would have been sold as calves at the average market price, they would have received on average $6.43/cwt less then what they were worth. However, the poorest steer should have been discounted by $23.30/cwt to break-even, whereas the best steer could have received a premium of $27.80/cwt and still broke-even. The average premium for steers in the two phase program was $3.10/cwt to just break-even and the range was a discount of $18.69/cwt to a premium of $19.04/cwt. While some premiums are given out under the current marketing structure, a producer with superior cattle probably will be required to retain ownership of his calves if he wants to receive the full value, or premium.

SUMMARY AND CONCLUSIONS

Most retained ownership summaries have shown an improvement in profitability when examined over several years. However, considerable variation in profitability existed for cattle fed as part of the South Dakota Retained Ownership Demonstration. It appears as if heavy, older cattle at weaning should

not be backgrounded and sold as feeders in late winter. Rather, these cattle should be fed a high energy finishing diet from weaning until slaughter. Cattle fed in a two-phase growing and finishing program need to grade Choice in order to be profitable because they are generally sold later in the year when the Choice-Select price spread is greater. Lighter weight calves appear to be most profitable in either a low rate of gain backgrounding program and then put on grass for the summer or a moderate rate of gain backgrounding program and sold in late winter. Cattle that do not have the propensity to grade Choice are generally less suitable for retained ownership programs that take them to slaughter weights.

By selling at weaning for the average market price, some producers may be accepting a price that is $27.80/cwt less then the break-even price for a retained ownership program, while others may be receiving a price that is $23.30/cwt over the break-even calf price for a retained ownership program.

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